Energy assurance planning: The business case for microgrids

By Rick Wornat

Under the sponsorship of the California Energy Commission (CEC), California has launched a program to assist local governments in developing plans to become more energy resilient. The California Local Energy Assurance Planning (CaLEAP) program provides funding to local governments to better prepare for and respond to natural disasters or other events that might interrupt electricity and other critical services over extended periods of time.

As the country has witnessed in recent events (e.g., Hurricane Katrina along the Gulf Coast, Superstorm Sandy in the Northeast), the underlying infrastructure to ensure public health and safety can be vulnerable. Although we can never be totally protected against disasters, many things can be done to mitigate their impact – especially to assure that basic public services (police departments, fire departments, health care facilities) can maintain effective operations.

A common theme: Microgrids

Energy Assurance Plans vary in scope and emphasis. In those that I have been involved with, microgrids appear as a common theme. In many municipalities, critical facilities such as police and fire stations, city hall and emergency operations centers, hospitals, and large facilities that might be used as shelters are centrally located. This creates the potential for serving these facilities on a common microgrid circuit. In the event of a loss of electrical supply on the main distribution network, the microgrid circuit would isolate from the network. Local generation would then provide electrical service on the microgrid circuit until external electrical supply is restored.

Designing a microgrid for this kind of application has many challenges:

- Selecting the best fuel type(s) for the microgrid generator
- Proper sizing of the generation to support facilities under emergency conditions
- Potential hardening of the electrical infrastructure for the microgrid
- Selecting the systems and controls for proper microgrid operation.

The biggest challenge of all?

Smart grid, smart grid technology, microgrids, grid reliability, energy assurance planning, EnerNex, strategy

However, one of the biggest challenges is the economics. The cost of a microgrid is non-trivial. Yet the core benefits (i.e., public health and safety, minimization of economic disruption, and maintaining civil order) are realized when and only when a disaster occurs. Still, the business case for a microgrid of this type can be improved if the investment is viewed not only for emergency power, but also as distributed generation (DG). This DG can be dispatched under

non-emergency conditions to offset high market prices. Or it can generate excess energy/capacity to be sold into the regional market.

From our reports store: "Smart Grid Business 2012 to 2017," published by Memoori, analyzes the smart grid market's size, technologies, finance and needed investments, demand forecasts and more.

Natural gas-fueled generators (rated for continuous duty) can often generate electricity at or below market prices during many hours of the year. This results in predictable value generation throughout the year. Or, if outfitted as combined heat and power (CHP) units, they can also be used to meet the heating requirements for facilities, providing additional value and improving the business case. Depending on the location and size of the microgrid generation and local/regional conditions, there may even be additional value potential from providing ancillary services into the market.

Key issues to address

The economics of every situation will vary, of course, and many other issues have to be addressed:

· Who owns the generation?
· What regulatory issues might be involved?
· Who is the local electricity supplier – investor-owned utility, municipal utility – and what are their interconnection requirements?

· Are there cost recovery issues?
· Who benefits from the offsetting value that might be created?
· Should non-public facilities (i.e., gasoline stations, grocery stores) be incorporated into the microgrid and, if so, how should they be treated?

Despite those issues, the potential value of distributed generation should be factored into the overall design of and business case for a microgrid. By factoring in a complete set of potential value streams, an investment whose primary purpose is to provide sustained electrical supply during a disaster can be structured to be more economically viable/attractive.

If the fundamental economics can be enhanced through a more robust microgrid design and a broader economic perspective, then the chances of resolving those other issues is greatly improved – and the citizenry of a local community can be the ultimate beneficiary.

For more information

California conducted two Energy Strategy workshops for local governments to identify energy technologies and strategies to become more resilient to energy disruptions. ICF International and EnerNex co-facilitated the workshops in June of 2013. Their goal was to provide a menu of

energy technologies and strategies that can be deployed to increase resilience. To view the full presentation, click here.

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